

Plume Velocimetry Diagnostic for Large Rocket Engines, Phase II

Completed Technology Project (2017 - 2021)

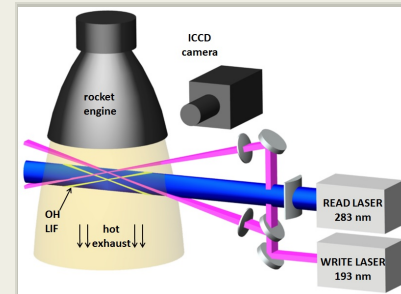


Project Introduction

A technique for measuring velocity in rocket plumes called hydroxyl tagging velocimetry (HTV), which was developed previously and demonstrated on a small rocket engine, is proposed for use on a full scale engine. Specific goals of the program include producing a measurement system that can withstand the high acoustic levels of a relevant full scale rocket engine, development of efficient user-friendly software for processing the raw images to produce velocity data, verifying the performance of the prototype at relevant temperatures and H₂O concentrations, and demonstrating it on a full scale rocket engine. The work plan includes tasks to design and construct a rugged prototype HTV system, including supporting analyses required to properly select the laser, camera, and optical components, test the prototype in a laboratory scale flame, and produce acoustic suppression covers and damping systems to enable a demonstration on a large engine.

Anticipated Benefits

NASA applications include the measurement of rocket performance on SLS engines, such as the Launch Abort engine of the CST-100 crew capsule, and on other NASA programs requiring the direct measurement of velocity from rocket plumes. Also, validation of computer models for rocket engine performance, leading to improvements in efficiency and reduction in cost of hardware development programs. Non-NASA applications include the measurement of velocity to obtain performance data in engine development programs in the commercial space transportation industry, rockets, missiles, scramjets, and turbine engines, new concepts in propulsion, pulse detonation engines, etc.



Plume Velocimetry Diagnostic for Large Rocket Engines, Phase II Briefing Chart Image

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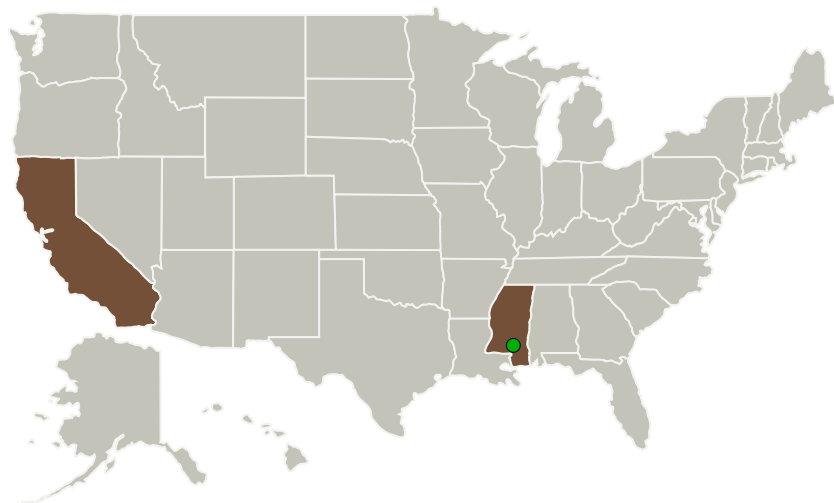
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Primary U.S. Work Locations and Key Partners




Organizations Performing Work	Role	Type	Location
MetroLaser, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Laguna Hills, California
● Stennis Space Center(SSC)	Supporting Organization	NASA Center	Stennis Space Center, Mississippi

Primary U.S. Work Locations

California	Mississippi
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Project Transitions

 **April 2017:** Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MetroLaser, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Managers:Scott L Jensen
Thomas M Stanley**Principal Investigator:**

Tom Jenkins

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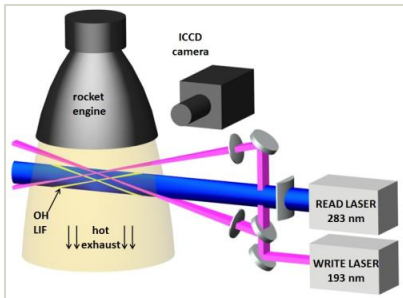


May 2021: Closed out

Closeout Documentation:

- Final Summary Chart PDF(<https://techport.nasa.gov/file/141017>)

Images

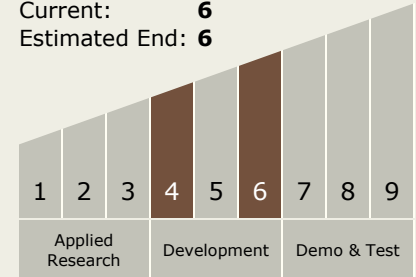


Briefing Chart Image

Plume Velocimetry Diagnostic for Large Rocket Engines, Phase II
Briefing Chart Image
(<https://techport.nasa.gov/image/132716>)

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System